Report from the CGMS WGI Task Group on Low Latency Data Access

Presented to CGMS-54 Working Group I session, agenda item 6.1

Coordination Group for Meteorological Satellites

EUMETSAT CGMS

Executive summary of the WP

The Low Latency Data Access Task Group was formed from the merger of the former Direct Broadcast Task Group and the Coordination of LEO Orbits Task Group.

The LLDA Task Group provides a forum for CGMS agencies to address improving LEO satellite systems low latency data access from both a global and regional perspective, harnessing common emerging technologies and taking account of the evolution of the commercial and agency space systems. It is foreseen that historical boundaries between global and regional mission requirements and architectures may be substantially eliminated.

The Terms of Reference presented at CGMS-53 has been updated to include the document Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis of Low Latency Data Access from LEO Meteorological Satellites" [CGMS-52-EUMETSAT-WP-13] as a living document for yearly presentation.

The SWOT analysis is presented separately with a proposal to close the ACTION WGI/A52.02 and raise a new action (see details in Agenda Point 6.5).

It has been concluded that it is premature to establish a low latency data access BP for the global mission (in response to the action A53.02). The Task Group shall follow the technological innovations identified in the SWOT analysis, and specific actions are recommended to further analyse potential for additional partnerships on ground segment acquisition as well as the potential for orbit coordination on future missions.

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LLDA TG Membership

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Lei Yang

EUMETSAT
Andrew Monham (TG co-chair)
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William Skip Dronen
Satya Kalluri
Toby Hutchings

Five LLDA Task Group Meetings took place between CGMS-53 and CGMS-54

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Terms of Reference – Low Latency Data Access Task Group from LEO satellites

1. To provide a forum for CGMS agencies to address improving LEO satellite systems low latency data access from both a global and regional perspective, harnessing common emerging technologies and taking account of the evolution of the commercial and agency space systems. It is foreseen that historical boundaries between global and regional mission requirements and architectures may be substantially eliminated. This shall include analysis of:
   a) Novel methods to achieve global data coverage and access
   b) Temporal coverage over a given geographic area
   c) Low latency data delivery
   d) Reducing pass scheduling conflicts
   e) Maximising the amount of instrument observation collected
   f) Reducing risk of radio frequency interference
   g) Fixed temporal separation between instrument observation
   h) Reduced risk of satellite proximity

2. To address technical and operational aspects of direct broadcast services (present and future) of mutual or global interest for the CGMS agencies

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Terms of References – Low Latency Data Access Task Group from LEO satellites

3. To promote standards and interoperability and operational procedures to the CGMS agencies for the benefit of the user community of their direct broadcast services and the associated regional retransmission services

4. To explore impact of space-based data relay systems
   Specific studies may be actioned by WGI to the LLDA TG to assess impact of new technologies on enabling innovative solutions to achieve low latency data access from LEO weather satellites

5. The LLDA task group report to CGMS WGI

6. The LLDA task group will nominate a chair. It will meet at least once a year, and more if necessary, and will pursue its work by correspondence between its meetings

Current LLDA TG co-chairs are Andrew Monham and Antoine Jeanjean.
Following CGMS-54, it is proposed that Andrew steps down and Nick Coyne will co-chair with Antoine.
The TG will meet at least 3 times per year.
The TG has a specific mailing list: L-WGI_LLDA@LISTSERV.EUMETSAT.INT

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Terms of Reference – Low Latency Data Access Task Group from LEO satellites

7. The LLDA yearly documents deliverables consist of:

- Item 1: Report from the CGMS WGI Task Group on Low Latency Data Access from LEO satellites (EUMETSAT)
- Item 2: Operational Direct Broadcast Systems Status Report & Status of Implementation of Best Practices at CMA
- Item 3: Operational Direct Broadcast Systems Status Report & Status of Implementation of Best Practices at EUMETSAT
- Item 4: Operational Direct Broadcast Systems Status Report & Status of Implementation of Best Practices at NOAA
- Item 5: Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis of Low Latency Data Access from LEO meteorological satellites

Actions from CGMS-53 on LLDA TG

LLDA TG	5.6	WGI/A52.02	Identify concrete CGMS actions based on the LLDA SWOT, including priority areas and demonstration cases in agencies. E.g. cloud, TT&C, relation with private sector, etc.	CGMS-53	**PROPOSE TO CLOSE**
LDA TG	**2.1**	WGI/A53.02	Report on the status of the global data low latency acquisition best practices at the CGMS-54.	CGMS-54 WGI	**PROPOSE TO CLOSE**
LLDA TG	**2.1**	WGI/A53.03	Review the contents of the Direct Broadcast information on the CGMS website and update as needed (Direct Broadcast – CGMS – Website).	CGMS-54 WGI	**PROPOSE TO CLOSE**

Action WGI A52.02

Identify concrete CGMS actions based on the LLDA SWOT, including priority areas and demonstration cases in agencies. E.g. cloud, TT&C, relation with private sector, etc.

- Please refer to the details of the proposed closure of this action in the doc /presentation: **Strengths, Weaknesses, Opportunities and Threats (SWOT) Analysis of Low Latency Data Access from LEO Meteorological Satellites:** *CGMS-54-EUMETSAT-WP-03, PPT (Agenda Point 6.5).*

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Action WGI A53.02 (1 of 2)

Report on the status of the global data low latency acquisition best practices at the CGMS-54

- Prior to the merger of the Coordination of LEO Orbits TG and the Direct Broadcast TG into the LLDA TG, a draft set of Best Practices was produced with the intention of promoting coordination on low latency data access for global data (as opposed to local / regional data achieved currently through DB). *CGMS-50-NOAA-WP-05*.
- It was requested to further review these draft BPs for potential overlap with the DB BPs and an attempt was made to produce a set of generic BPs applicable to both global and local/regional data, complemented by specific BPs where needed.
- However, whereas DB technologies and operational partnerships are very mature and have been operational for many years, the same is not true for (very) low latency global data acquisition.
  - Technologies such as inter-satellite data relay, phased array ground antennas, cloud data processing and dissemination services are being investigated, but not yet operational in CGMS agencies.
  - Operational partnerships allowing coordination of phased orbits and sharing of additional ground infrastructure in support of global data acquisition is only done to a limited extent.

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Action WGI A53.02 (2 of 2)

Report on the status of the global data low latency acquisition best practices at the CGMS-54.

- **Conclusion:**
  - Premature to establish a low latency data access BP for the global mission. **Action should be closed**.
- **Recommendation:**
  - LLDA TG to keep abreast of technology developments and adoption by CGMS agencies which would facilitate the transition to very low latency global data acquisition. This will be achieved through the on-going work on the SWOT analysis which shall remain a living document (see ToR slides).
  - LLDA TG to assess the value obtained from existing global data acquisition partnerships (such as between EUMETSAT and NOAA in the sharing of Svalbard and McMurdo data acquisitions) and estimate the projected value of wider cooperations (additional agencies, additional stations).
  - LLDA to identify future opportunities for coordination of LEO orbits with a view to synchronised phasing (taking into account the work of the Coordination of LEO Orbits TG: *CGMS-49-EUMETSAT-WP-05*, PPT) and estimate potential value compared to uncoordinated systems.

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Action WGI A53.03

Review the contents of the Direct Broadcast information on the CGMS website and update as needed (Direct Broadcast – CGMS – Website).

- Review has been performed and website updated
  - New FY3F satellite was added
  - Decommissioned N18/N19 satellites were removed

Action has already been closed during WGI intersessional meeting.

Key issues of relevance to CGMS:

- The Low latency Data Acquisition Task Group includes in scope the considerations under HLPP 2.9: New technologies for satellite systems.

To be considered by CGMS:

➢ WGI is invited to :

- Consider the proposed approach to ensuring progress on Action A52.02 relating to the SWOT Analysis of Low Latency Data Access from LEO Meteorological Satellites *CGMS-54-EUMETSAT-WP-03*, *PPT* *(Agenda Point 6.5)* including the proposed closure of the action A52.02 and proposal for a new action.
- Take note of the report on the status of the global data low latency acquisition best practices at the CGMS-54,its conclusion that it is premature to establish a low latency data access BP for the global mission, the proposed closure of the corresponding action A53.02 and recommendations to raise two new actions:
  - LLDA TG to assess the value obtained from existing global data acquisition partnerships (such as between EUMETSAT and NOAA in the sharing of Svalbard and McMurdo data acquisitions) and estimate the projected value of wider cooperations (additional agencies, additional stations).
  - LLDA to identify future opportunities for coordination of LEO orbits with a view to synchronised phasing (taking into account the work of the Coordination of LEO Orbits TG: CGMS-49-EUMETSAT-WP-05, PPT) and estimate potential value compared to uncoordinated systems.
- Take note of the updated Direct Broadcast information on the CGMS website and proposed closure of A53.03